REMARKS

Status of the Claims

Upon entry of the amendment above, claims 1-13, 15-18, and 20-28 will be pending, claims 1, 5, 7, 18, and 21 being independent.

Summary of the Office Action

Claims 11, 13, 15, and 18 are rejected under 35 USC §112, second paragraph, as being indefinite.

Claims 1-4, 11, 12, 14, and 19-22 are rejected under 35 USC §103(a) as being unpatentable over POLIFRONI (U.S. Patent No. 6,817,115 or US Patent Application Publication No. 2003/0061739).

Claims 5, 6, 13, and 18 are rejected under 35 USC §102(e) over POLIFRONI.

Claims 7, 10, 15-17, and 23 are rejected under 35 USC §103(a) as being unpatentable over BONAVENTURE (U.S. Patent No. 5,228,218) in view of POLIFRONI or BAUERFEIND (U.S. Patent No. 5,438,768).

Claims 8 and 9 are rejected under 35 USC §103(a) as being unpatentable over BONAVENTURE in view of POLIFRONI or BAUERFEIND and further in view of MAREGA (U.S. Patent No. 4,920,666).

Response to the Office Action

A. Summary of the Amendment

Independent claim 5 has been amended by having incorporated therein the subject matter of claim 14, and independent claim 18 has been amended by having incorporated therein the subject matter of claim 21.

In addition, new claims 24-28 have been added.

B. Withdrawal of Indefiniteness Rejection

Reconsideration and withdrawal of the rejection of dependent claims 11, 13, 15, and 18 under 35 USC §112, second paragraph, are kindly requested.

Each of the rejected claims refers to the abrasive anti-slip feature of the invention being provided only upon the exertion of a downward pressure. In independent claim 18, this feature is recited in means-plus-function format.

The rejection is based upon the assertion that the aforementioned limitation is "confusing, vague, and indefinite because it is not clear what structural limitations applicant intends to encompass with such language." In addition, the rejection includes the comment that there is "no guidance in the specification as to what such language would encompass and the sand paper disclosed is not considered to have such property."

Applicants respectfully disagree with the rejection. The specification is believed to in fact provide such "guidance," i.e., as to what such language would encompass. Paragraph 0014 is believed to be quite descriptive in this regard. The first sentence of that paragraph reads as follows: "... the abrasive paper ensures anti-slip properties only when a certain pressure is exerted thereon." The next sentence explains that "... this pressure must be exerted from top down."

Further, MPEP Section 2173.05(a) explains, in the context of rejections for indefiniteness, that "[w]hen the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to achieve a complete exploration of the applicant's invention and its relation to the prior art. *In re Zletz*, 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989)."

At least for the aforementioned reasons, reconsideration and withdrawal of the rejection under 35 USC §112, second paragraph, is kindly requested.

B. Withdrawal of §103 Rejection of Claims 1-4 11, 12, 14, and 19-22 Based Upon POLIFRONI

Reconsideration and withdrawal of the rejection of claims 1-4, 11, 12, 14, and 19-22 under 35 USC §103(a), based upon POLIFRONI, are kindly requested, as well as the reconsideration and withdrawal of all rejections which rely upon POLIFRONI.. Because independent claim 5 has been amended above to add the subject matter of claim 14 and because independent claim 18 has been amended to add the subject matter of claim 19, this ground of rejection encompasses independent

claims 5 and 18, all claims depending therefrom, as well as independent claims 1 and 3 and the claims depending therefrom.

The rejection is based upon the position that the anti-slip inserts 48, 49 of POLIFRONI (see Figs. 6, 7, e.g.) are abrasive. In column 4, lines 50-51, of POLIFRONI, to which attention is directed in the rejection, the inserts are said to be made "of any suitable slip resistant material, such as rubber or the like."

On page 5 of the Office action, it is explained, in refuting an argument Applicants had made previously, that "sand paper would prevent slipping even without pressure on the paper." Applicants respectfully traverse his assertion, which conflicts with the description in paragraph 0004 of the specification of the instant application that "[t]he use of an anti-slip material based upon rubber or similar products is not recommended as they could hinder the extraction or the manual positioning of the sole [i.e., inner sole]."

The word "abrasive" refers to a wearing away, i.e., having a destructive effect on a material. Of course, sandpaper is a material that can be characterized as abrasive. POLIFRONI's "slip-resistant material, such as rubber or the like" (column 4, lines 50-51) is ***not*** abrasive, in contrast to the allegation made in the sentence bridging pages 4 and 5 of the Office action and in the sentence following, on page 5, lines 1-2 of the Office action, which, Applicants submit, are based upon erroneous speculation.

Not only does POLIFRONI disclose nothing that would support such speculation, in fact, POLIFRONI teaches the opposite. That is, in column 2, lines 2-4, POLIFRONI describes his molded arch support device as having "improved non-slip frictional properties, ***without tending to damage any surface against which it is placed.***" Therefore, Applicants submit, the interpretation of POLIFRONI's disclosure, upon which the rejections are based, is contrary to POLIFRONI's explicit description. Accordingly, withdrawal of the rejections which rely upon POLIFRONI is kindly requested at least for this reason.

Further, in this regard, attached hereto is a six-page document from the Chapter entitled "Friction," from *The Physics Hypertextbook*, by Glenn Elert, accessible at www.hypertextbook.com/physics/friction, copyright 1998-2006. Page 4, lines 13-14, states that

"Friction and abrasion are different phenomena." On page 4, lines 17-18, it is explained that "The material is what determines the amount of friction, not is [sic, its] surface texture." In this regard, although POLIFRONI discloses a "rubber or the like" anti-slip surface, which provides an enhanced friction, POLIFRONI discloses nothing regarding abrasion, i.e., a different phenomena.

With specific reference to claims which refer to an abrasive paper or fabric or an abrasive amalgam, to which the rejection characterizes as "a matter of obvious design choice" (see page 3, lines 3-7), Applicants respectfully direct attention to the Manual of Patent Examining Procedure (MPEP), Section 2143.01, which explains that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there would be no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). In this regard, "rubber or the like," which is mentioned by POLIFRONI in column 4, line 50, cited in the rejection, would not encompass an abrasive paper or fabric, at least in view column 2, lines 2-4, which describes the molded arch support device as having "improved non-slip frictional properties, without tending to damage any surface against which it is placed."

C. Withdrawal of §103 Rejection of Claims 7, 10, 15-17, and 23, Based Upon BONAVENTURE in view of POLIFRONI or BAUERFEIND

Reconsideration and withdrawal of the rejection of claims 7, 10, 15-17, and 23 under 35 USC §103(a), based upon BONAVENTURE in view of POLIFRONI or BAUERFEIND, are kindly requested,

First, with regard to the combination of BONAVENTURE and POLIFRONI, Applicants submit that one skilled in the art of the invention, such as the invention of BONAVENTURE, would not likely consider using a rigid arch support made of a molded plastic material, as disclosed by POLIFRONI, particularly because it would tend to lessen the quality and extent of feedback that a skier would enjoy otherwise.

Further, Applicants respectfully traverse the reliance upon POLIFRONI for reasons advanced above in connection with the rejection of claims 1-4, 11, 12, 14, and 19-22.

With regard to the secondary teachings of BAUERFEIND, Applicants submit that the particular teachings upon which the rejection might rely are not clearly evident.

The only hint of an *abrasive* surface in BAUERFEIND, it would appear, is the description in column 3, lines 46-52, which disclosure is not clear or relevant. There, BAUERFEIND seems to be saying that if only the "wrong" half of the Velcro-type fastening members were used, there would be a "roughness" (column 3, line 51) facing down on the inside sole of the shoe. But the relevance of this is not seem to be clear at all. First, it would seem that BAUERFEIND does not recommend using only half of the fastening members; instead, the "covering part 14" covers the "bearing part 12". Second, BAUERFEIND seems to be saying that if only one-half of the fastening members are to be used, the "hooked part" should *not* be used because there would be a roughness.

Applicants have noted that, in both embodiments, *i.e.*, in Figs. 1, 2 and Fig. 3, BAUERFEIND includes "adhering parts" (column 2, line 65), each of which includes a "covering sheet 20" (column 2, line 67). In the sentence from column 2, line 68, to column 3, line 4, once the covering sheets are removed from the adhering parts, the inserted sole 1 is then securely positioned in the shoe. However, there seem to be at least two points that distinguish these parts 18 from Applicants' invention. First, these bearing parts are not positioned in the metatarsophalangeal area. Second, the adhering parts 18, Applicants submit, likely have *adhesive* surfaces; not *abrasive* surfaces. Thereby, after the sole 1 is positioned within the shoe, repeated removal and insertion would be impractical and, therefore, not responsive to the "removable and non-fixed" limitation in claim 7.

At least for the foregoing reasons, reconsideration and withdrawal of the rejection of claims 7, 10, 15-17, and 23 are kindly requested.

D. Withdrawal of §103 Rejection of Claims 8 and 9, Based Upon BONAVENTURE in view of POLIFRONI or BAUERFEIND and MAREGA

Reconsideration and withdrawal of the rejection of claims 8 and 9 under 35 USC §103(a), based upon BONAVENTURE in view of POLIFRONI or BAUERFEIND and MAREGA, are kindly requested and least for the reasons given above in connection with parent claim 7.

E. New Claims

New dependent claims 24-28 have been added. Claim 24 is similar to claim 23, but depends from independent claim 21, rather than from independent claim 18.

New claims 25-28 are similar, but depend from respective ones of independent claims 1, 5, 7, and 18. These claims refer to the inner sole having a flexibility for being deformed into an accordion shape during withdrawal of the wearer's foot from the article of footwear. Support for this limitation can be found in paragraph 0014 of the specification of the instant application.

Of course, the documents relies upon do not disclose such an inner sole.

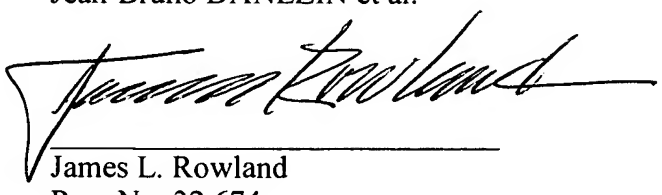
SUMMARY AND CONCLUSION

The grounds of rejection advanced in the Office action has been addressed and is believed to be overcome. Reconsideration and allowance are respectfully requested in view of the amendment and remarks above.

Payment is being made herewith for extra claims, for an extension of time, and for a Request for Continued Examination. However, the Commissioner is authorized to charge any fee required for acceptance of this reply as timely and complete to Deposit Account No. 19-0089.

Any comments or questions concerning this application can be directed to the undersigned at the telephone number, fax number, or email address given below.

Respectfully submitted,
Jean-Bruno DANEZIN et al.



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Attachment: Elert, Glenn, *The Physics Hypertextbook*, www.hypertextbook.com/physics/friction, copyright 1998-2006, pp. 1-6.

Friction

The Physics Hypertextbook™

(www.hypertextbook.com/physics/mechanics/friction)

Discussion

The force between surfaces in contact that resists their relative tangential motion (slipping).

Types: static & kinetic

Classical Approximations

- independent of
  - surface area,
  - speed (except when v = 0), and
  - temperature
- depends on the nature of the surfaces in contact and is
- directly proportional to the normal force.
  - Interesting quote ...
  - Guillaume Amontons (1663-1705) France
  - It was Guillaume Amontons who first established that there existed a proportional relationship between friction force and the mutual pressure (or force) between the bodies in contact. We recognize that relationship when we divide friction force by normal force - and identifying the quotient as the "coefficient of friction". Amontons' paper "De la résistance causée dans les machines" was published in 1699 in *Memoires de l'Académie des Sciences*.

microscopic description

miscellaneous stuff

- Recently it has been shown that the lubricant properties of graphite disappear under ultra high vacuum, and hence that molecules of gases, such as oxygen and nitrogen, most probably act as a kind of molecular grease to help the sheets slide past each other.
- Roughness is a minor factor affecting friction. Friction is often higher between smooth surfaces. Insects can walk on windows.

- If friction is independent of surface roughness, why do tires have tread? Tire tread sheds water.
- Teflon has such a low coefficient of friction that it often peels off of pots and pans. (Use wooden or plastic utensils.) How do you get it to stick? Dreadlocks analogy: Teflon is a polymer, individual strands of hair are slippery, but strands can tangle to the point where they can't be separated.
- Humans have very little body hair. Why are certain areas still densely covered with hair? Evolutionary advantages. Describe them!
- Dynamic friction even exist on the galactic scale. The gravitational tug of passing planets is much the same as the electrostatic forces between passing atoms. The coherent motion of groups of planets will eventually degrade into the random motion of individual planets.

Coefficients of Friction for Selected Interfaces
(in order of generally decreasing value)

μ_s	μ_k	Interface
	1.16	rubber - rubber
	1.02	rubber - concrete
	0.72	car tire - asphalt
	0.35	car tire - grass
0.8 - 1.0		skin - metals
0.9 - 1.0		glass - glass
	0.9	sheep - steel mesh
	0.7	sheep - plastic batten ($\perp$)
	0.6	sheep - plastic batten ($\parallel$)
	0.6	sheep - wood batten ($\perp$)
	0.5	sheep - wood batten ($\parallel$)
0.58		steel - steel
0.4		brakes - cast iron
0.6		wood - brick
0.2 - 0.6		wood - metals
0.29	0.22	wood - felt
0.28	0.17	wood - wood
0.3		snow - nylon
0.04 - 0.4	0.04 - 0.4	snow - hickory, waxed
0.1		graphite - graphite
0.1		graphite - steel
	0.03	ice - steel
0.05 - 0.5	0.02 - 0.09	ice - ice

0.2		teflon - steel
0.04		teflon - teflon
	0.0013	tendon - sheath
	0.003	normal bone joints

Summary

- Definition
  - Friction is the force between surfaces in contact that resists their relative tangential motion.
  - "Relative tangential motion" is a fancy way to say "slipping".
  - Its direction is opposite the relative velocity (or intended velocity).
- Types
  - Dry Friction
    - The resistive force between clean dry solid surfaces.
    - The phenomena one normally associates with the word friction. Friction is normally synonymous with dry friction.
  - Viscous Friction
    - The resistive force between surfaces in relative motion through a fluid (liquids & gases).
  - Rolling Resistance
    - The resistive force experienced by rolling objects.
    - Since rolling does not does not necessarily involve slipping, rolling resistance is not really a form of friction.
- Factors affecting dry friction
  - Dry friction is directly proportional to the normal force between the two surfaces in contact.
  - Dry friction depends on the materials in contact. This factor is measured by the quantity known as the coefficient of friction which is ...
    - the ratio of the friction force to the normal force.
    - unitless
    - always greater than 0
    - usually less than 1 for most everyday materials
  - Dry friction is subdivided into two types.
    - Static friction ...
      - occurs when the two surfaces in contact <u>are not</u> in relative motion; that is, when one surface is stationary relative to the other surface,
      - varies in strength from zero (when no external force is trying to force slippage) to some maximum value (just before slippage occurs)
    - Kinetic friction ...

        - occurs when two surfaces in contact are in relative motion; that is when one surface is slipping or sliding across another surface,
        - is always weaker than the maximum static friction.
- Factors that don't affect dry friction
    - Friction is largely independent of surface roughness (despite what you may have read in other textbooks).
        - Protrusions or rough spots may provide microscopic ledges where one surface can rest upon another and apply a normal force. This is not friction.
        - The friction associated with sandpaper is no greater than the friction associated with quartz. Friction and abrasion are different phenomena.
        - Ice, glass, and rubber can all be made smooth but ice has a low coefficient of friction, glass a medium coefficient, and rubber a high coefficient. The material is what determines the amount of friction, not is surface texture.
        - Sanding a slippery surface may increase its friction by removing the low friction surface material and exposing an underlying high friction material.
    - Friction is independent of speed once an object is moving.
        - Faster does not mean more friction.

Problems

practice

1. Push a load with enough force to overcome dry friction. What happens after it starts moving?
    - Answer it.
2. Determine the following quantities for a car driving on a level surface with a coefficient of static friction of 0.75 (3/4) and a coefficient of kinetic friction of 0.67 (2/3).
    a. Determine the car's maximum starting acceleration with and without "burning rubber". How do these two methods of starting a car compare?
    b. Determine the car's minimum braking distance with normal brakes and antilock brakes as a function of initial speed. How do these two methods of stopping a car compare?

    Solution ...

    c. The net external force propelling a car comes from the friction force between tires and pavement. When a driver starts a car by "flooring it" (pressing the

accelerator to the floor) the tires grind on the road producing a smoke of burning rubber and pavement. Since the tires are slipping, the coefficient of kinetic friction determines the maximum acceleration. Under normal circumstances, however, most drivers are not willing to subject their tires to such extreme punishment. Typical car tires rotate over the surface of the road without slipping, thus the coefficient of static friction determines a car's maximum acceleration in most situations.

d. To solve this problem, set the frictional force on level ground equal to the net force of the second law of motion.

$$F_{net} = ma \qquad a = \mu g \qquad \frac{a_{\text{burning rubber}}}{a_{\text{normal}}} = \frac{\mu_k g}{\mu_s g} = \frac{\mu_k}{\mu_s}$$

$$f = \mu N = \mu mg = ma \qquad a_{\text{burning rubber}} = 2/3(9.8\ \text{m/s}^2) \qquad \frac{a_{\text{burning rubber}}}{a_{\text{normal}}} = \frac{2/3}{3/4} = \frac{2}{3}\cdot\frac{4}{3} = \frac{8}{9}$$

$$a = \mu g \qquad a_{\text{burning rubber}} = 6.54\ \text{m/s}^2 \qquad \frac{a_{\text{burning rubber}}}{a_{\text{normal}}} = 88.9\%$$

$$a_{\text{normal}} = 3/4(9.8\ \text{m/s}^2)$$

$$a_{\text{normal}} = 7.35\ \text{m/s}^2$$

e. Contrary to popular belief, flooring the accelerator is not an effective method of starting a car. Burning rubber is only about 90% as effective as accelerating a car normally from rest.

f. The net external force stopping a car comes from the friction force between tires and pavement. Stopping a car with ordinary brakes may result in wheel lock; that is, the wheels lock in position and are not able to rotate. When this happens, the tires skid and the coefficient of kinetic friction determines the braking distance. Cars equipped with an antilock braking system (ABS) have a sensor that releases the brake pads the instant the wheel locks up. After a brief pause the brakes are then quickly re-engaged. If they don't lock up again, all is well. If they do, the ABS releases the brake pads again. This processes can repeat many times a second. In any case, the tires are not allowed to lock for more than a few milliseconds. The car is then stopped using the force of static friction alone.

g. To solve this problem, determine acceleration using the displacement-velocity formula of kinematics. Set this equation equal to the formula for acceleration due to friction derived above.

$$v^2 = 2a\Delta s \qquad \Delta s = \frac{v^2}{2\mu g} \qquad \frac{\Delta s_{\text{ABS}}}{\Delta s_{\text{normal}}} = \frac{v^2/2\mu_k g}{v^2/2\mu_s g} = \frac{\mu_s}{\mu_k}$$

$$a = \frac{v^2}{2\Delta s} = \mu g \qquad \Delta s_{\text{burning rubber}} = \frac{v^2}{2(2/3)(9.8\ m/s^2)} \approx \frac{v^2}{13.1} \qquad \frac{\Delta s_{\text{ABS}}}{\Delta s_{\text{burning rubber}}} = \frac{2/3}{3/4} = \frac{2}{3}\cdot\frac{4}{3} = \frac{8}{9}$$

$$\Delta s = \frac{v^2}{2\mu g} \qquad \Delta s_{\text{ABS}} = \frac{v^2}{2(3/4)(9.8\ m/s^2)} \approx \frac{v^2}{14.7} \qquad \frac{\Delta s_{\text{ABS}}}{\Delta s_{\text{normal}}} \approx 88.9\%$$

h. Antilock brakes need 90% of the distance of regular brakes to stop a car traveling at the same speed. This decrease in distance is certainly significant, but doesn't really seem all that great given the high cost of an ABS. In addition to reduced braking distance, however, antilock braking systems also increase performance during extreme braking. Locked brakes are useless for steering. ABS ensures that the wheels retain their static frictional grip on the road, which allows for maneuvering while braking in an emergency.

3. Critical angle for object on a ramp
    - Answer it.
4. Write something completely different.
    - Answer it.

conceptual

1. Note to self: work this idea into a problem of some sort. "The horizontal force component of the heel as it strikes the ground when a person is walking has been measured and found to be approximately 15% of a person's weight."

Resources

- graphite
    - Allotropes, Nigel Bunce & Jim Hunt, University of Guelph
- miscellaneous
    - An Analysis of the Forces Required to Drag Sheep over Various Surfaces [pdf]. Jack Harvey, John Culvenor, Warren Payne, Steve Cowley, Michael Lawrance, David Stuart, & Robyn Williams. *Applied Ergonomics*. Vol. 33, No. 6 (November 2002): 523-31.
    - Comparison of Different DuPont Fluoropolymers (Teflon)